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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,905	03/12/2004	Thomas J. O'Keefe	31550-1001	8305

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PEACOCK MYERS, P.C.
201 THIRD STREET, N.W.
SUITE 1340
ALBUQUERQUE, NM 87102

EXAMINER	
LEADER, WILLIAM T	
ART UNIT	**PAPER NUMBER**
1753	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/799,905	O'KEEFE ET AL.	
	Examiner	Art Unit	
	William T. Leader	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-47* is/are pending in the application.

4a) Of the above claim(s) *26 and 28-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25,27 and 33-47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/21/2004; 9/20/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Receipt of the papers filed on April 20, 2007, is acknowledged. Applicant has elected species II and identified claims 1-25, 27 and 33-47 as reading on this species. Claims 26 and 28-32 are withdrawn from consideration.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-25, 27 and 33-47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 1 recites the step of seeding the deposition substrate with a seed composition. This step appears to form a seed composition or film on the deposition substrate. Claim 1 additionally recites the step of depositing the desired deposition component onto the substrate to form a seed composition or film. It is not clear if applicant intends this additional step to form a second layer which is in additional to the layer formed by seeding. Thus, it is not clear if claim 1 requires that two separate seed layers be formed. Additionally, the function of the step of seeding the substrate is not clear. Does the seed composition in some manner influence the depositing of the deposition composition?

5. Clam 1 requires that the seed composition comprise a more noble composition than a less noble deposition substrate. The terms noble is generally associated with metal. However,

dependent claim 2 recites that the seed composition comprises at least one of a metal, metal alloy or a metal-containing compound. Since a dependent claim further limits the claim from which it depends, the more noble composition of claim 1 must be something other than one of the metal materials included in claim 2. It is not apparent what other materials are included or how it would be determined whether this material is more or less noble than the substrate.

6. Claim 6, line 1 lacks antecedent basis for "the barrier layer". It is not apparent where the barrier layer is formed. Additionally claim 6 recites a metal combination and a non-metal combination. The scope of these terms is not clear. What is the metal or nonmetal in combination with?

7. Claim 9 recites "any other less noble compositions". It is not apparent what the composition is less noble than.

8. Claim 16 recites that the step of treating the deposition substrate includes introducing a halogenated compound into the organic solution. Claim 20 recites introducing an acid or base into the organic solution. It is not apparent how adding a compound to a solution treats the substrate.

9. Claim 17, line 1 lacks antecedent basis for "non-halogenated compound".

10. In claim 40, it is not clear what the galvanic coating is simultaneous with. In claim 41 it is not clear what the galvanic coating is separate from.

11. In claim 45 it is not clear what the pressure is elevated relative to.

Claim Objections

12. Claims 7, 8, 35 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. It appears that a material is an ion or is neutral. Thus, it is not apparent that claim 7 further limits claim 1. With respect to claim 8, it appears that a material is either a metal or a non-metal. With respect to claim 35, it appears that a material is either organic or inorganic.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 1-9, 13, 15-18, 20-24 and 35-47 are rejected under 35 U.S.C. 102(b) as being anticipated by Miura et al (5,302,256)

15. The Miura et al patent is directed to immersion plating to form a deposit on a substrate. A plating bath which is an organic solution with a deposition component is provided. The basic composition of the plating bath is an organic sulfonic acid, divalent tin and lead salts of the organic sulfonic acid, and thiourea which serves as a chelating agent (column 2, lines 29-33). Miura et al discloses catalyzing a substrate with palladium which is a noble metal (column 4, line 60). This step forms a seed layer and corresponds to the step of seeding recited in claim 1. After

deposition of copper, an immersion coating of tin/lead is formed. This corresponds to the step of depositing the desired deposition composition. Thus, all steps recited in claim 1 are disclosed by Miura et al.

16. With respect to claims 2 and 3, the seed composition is palladium. With respect to claim 4 and 5, the deposition components are lead and tin. With respect to claim 6, the deposit of tin/lead may be considered to be a metal combination. With respect to claim 7, the tin and lead are provided as divalent salts and would be present as ions. With respect to claim 8, the deposition substrate is a glass epoxy material (column 4, lines 58-59) which is a non-metal. With respect to claim 9, the substrate is considered to be a less noble composition. With respect to claim 13, the plating of Miura et al comprises two deposition components (lead and tin). With respect to claim 15, 16 17 and 20, Miura et al disclose that it is known to include borofluoric acid (HBF_4) in tin/lead immersion baths (column 1, line 24). With respect to claim 18, Miura et al disclose the inclusion of thiourea in the plating solution. With respect to claims 21 and 22, Miura et al disclose etching the substrate (column 4, lines 47). With respect to claim 23, the plating bath of Miura et al is highly acidic with a pH which is at most 2 (column 4, lines 27-29). Such as acidic solution would etch the substrate. With respect to claim 24, the plating bath of Miura et al is a single phase solution. With respect to claims 35-37, Miura et al disclose adding organic additives to the bath. Claim 38 is considered to further limit the Markush group recited in claim 36 but not require the inclusion of any particular additive from the group. With respect to claim 39, the lead and tin are present as ions and are reduced to form a metallic deposit. With respect to claim 40, lead and tin are simultaneously galvanically deposited. With respect to

claim 41, the step of depositing the lead and tin is separate from the step seeding with palladium. With respect to claim 42, the lead and tin are loaded into the plating solution. With respect to claim 43, the lead and tin ions in the bath are transported to the substrate surface to be deposited. With respect to claim 44, Miura et al teach using a temperature of 40-90°C (column 4, lines 36-37. Claim 45 recites an elevated pressure but doe snot specify what the pressure is elevated with respect to. Ambient pressure is elevated to vacuum coating processes which are carried out at reduced pressures. Claim 46 and 47 recite depositing by electrochemical reaction. The galvanic coating recited in claims 40 and 41 is a type of electrochemical reaction.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

19. Claims 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miura et al (5,302,256) in view of Zhao et al (5,660,706).

20. Claim 10 recites a number of compounds which the substrate includes. One such compound is TiN. The Zhao et al patent is directed to electroless metal deposition for depositing a metal such as copper. Zhao et al disclose that it is known to electrolessly deposit copper on substrates which include a TiN layer. See column 2, lines 12-33. The TiN functions as a barrier layer as recited in claim 14. It would have been obvious to have applied the coating process of Miura et al which includes seeding and electroless copper deposition on a substrate comprising TiN because Zhao et al disclose that this deposition technique is effective on TiN substrates.

21. Claims 12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miura et al (5,302,256) in view of the Lowenheim text *Modern Electroplating*.

22. Claim 12 differs from the process of Miura et al by reciting the inclusion of a non-metallic element in the seed composition. The Lowenheim text discloses that baths for forming a palladium seed layer may contain HCl. See page 465. It would have been obvious to have included a non-metallic element in the seed composition used in Miura because this is typical as disclosed by Lowenheim. Claim 19 recites the inclusion of sulfuric acid. As noted above, Miura et al disclose that the plating bath is highly acidic. Lowenheim discloses that the inclusion of sulfuric acid in an acidic tin plating bath is known. It would have been obvious to have included sulfuric acid in the highly acid tin plating bath of Miura et al since this is a recognized bath constituent as shown by Lowenheim.

23. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miura et al (5,302,256) in view of Stouffer et al (US 2004/0249023).

24. Claim 27 differs from the process of Miura et al by reciting the inclusion of a cation exchange reactant. The Stouffer et al patent is directed to a coating metal substrate with a corrosion resistant coating. One of the constituents of the coating composition may be an ion exchange resin (claim 1) which may be a cation exchange resin (claim 19). See also paragraph [002]. It would have been obvious at the time the invention was made to have included a cation exchange resin in the plating bath of Miura et al because a more corrosion resistant coating would have been obtained.

25. Claims 33 and34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miura et al (5,302,256) in view of the Lowenheim text Modern Electroplating and Cimermancic et al (6,284,123).

26. Claim 33 recites agitating the organic solution while claim 34 specifies that the agitation is ultrasonic. The Lowenheim text teaches that agitation increases transport of ions being deposited (page 21). The Cimermancic et al patent is directed to electroplating and discloses that agitation of the plating bath may be by ultrasonic agitation (column 7, lines 59-62). It would have been obvious to have agitated the plating bath of Miura et al as shown by Lowenheim because transport of depositing ions would have been improved. The use of ultrasonic agitation

would have been obvious because it is shown by Cimermancic et al to be effective in agitating a plating bath.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William T. Leader whose telephone number is 571-272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

William Leader
July 6, 2007

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700